IN THE CLAIMS:

Claims 1-134. (Cancelled).

135. (New) An injectable thetagel solution for injection into a body space, wherein the injectable solution is obtained by a process comprising the steps of:

dissolving polyvinyl alcohol (PVA) molecules in a first solution to form a PVA solution, wherein the first solution has a Flory interaction parameter (chi value) that is not sufficient for gelation;

contacting the PVA solution with a second solution in a controlled manner, wherein after the contacting the combination of both solutions has a Flory interaction parameter (chi value) that is sufficient for gelation, and thereby forms an injectable thetagel solution; and

maintaining for a period of time the injectable thetagel solution at a temperature such that it is in a workable state, wherein the injectable thetagel solution can be injected into a body space, and therein gel *in situ* after the injection to form in the body space a polymer hydrogel that has physical crosslinks between PVA molecules, wherein the polymer hydrogel is formed without chemical crosslinkers, irradiation or thermal cycling, and wherein the polymer hydrogel can fill the body space.

136. (New) The injectable thetagel solution according to claim 135, wherein the first solution comprises one or more selected from the group consisting of deionized water, and dimethylsulfoxide.

137. (New) The injectable thetagel solution according to claim 135, wherein the second solution comprises one or more selected from the group consisting of salts, alcohols, polyols, amino acids, sugars, proteins, and polysaccharides.

138. (New) The injectable thetagel solution according to claim 135 wherein the hydrogel is anisotropic in one or more properties.

139. (New) The injectable thetagel solution according to claim 135, wherein the contacting comprises mixing.

140. (New) The injectable thetagel solution of claim 135, wherein the injectable thetagel solution comprises about 1.0 to about 50.0 weight percent polyvinyl alcohol.

141. (New) The injectable thetagel solution of claim 135, wherein after the contacting the Flory interaction parameter is 0.25 to 1.0.

142. (New) The injectable thetagel solution of claim 135, wherein the PVA solution contains one or more non-gelling components.

143. (New) The injectable thetagel solution of claim 135, further comprising hyaluronic acid.

144. (New) The injectable thetagel solution of claim 135, further comprising polyacrylic acid.

145. (New) The injectable thetagel solution of claim 135, further comprising a therapeutic agent.

146. (New) A polymer hydrogel formed within a body space, wherein the polymer hydrogel is obtained by a process comprising the steps of:

(I) injecting an injectable thetagel solution into a body space, wherein the injectable thetagel solution is produced by:

(A) dissolving polyvinyl alcohol (PVA) molecules in a first solution to form a PVA solution, wherein the first solution has a Flory interaction parameter (chi value) that is not sufficient for gelation;

(B) contacting the PVA solution with a second solution in a controlled manner, wherein after the contacting the combination of both solutions has a Flory interaction parameter (chi value) that is sufficient for gelation, and thereby forms the injectable thetagel solution; and

(C) maintaining for a period of time the injectable thetagel solution at a temperature such that it is in a workable state;

and

(II) allowing the injectable thetagel solution to gel *in situ* after the injection to form in the body space a polymer hydrogel that has physical crosslinks between PVA molecules, wherein the polymer hydrogel is formed without chemical crosslinkers, irradiation or thermal cycling.

147. (New) The polymer hydrogel according to claim 146, wherein the first solution comprises one or more selected from the group consisting of deionized water, and dimethylsulfoxide.

148. (New) The polymer hydrogel according to claim 146, wherein the second solution comprises one or more selected from the group consisting of salts, alcohols, polyols, amino acids, sugars, proteins, and polysaccharides.

149. (New) The polymer hydrogel according to claim 146 wherein the hydrogel is anisotropic in one or more properties.

150. (New) The polymer hydrogel according to claim 146, wherein the contacting comprises mixing.

151. (New) The polymer hydrogel of claim 146, wherein the injectable thetagel solution comprises about 1.0 to about 50.0 weight percent polyvinyl alcohol.

152. (New) The polymer hydrogel of claim 146, wherein after the contacting the Flory interaction parameter is 0.25 to 1.0.

153. (New) The polymer hydrogel of claim 146, wherein the PVA solution contains one or more non-gelling components.

154. (New) The polymer hydrogel of claim 146, further comprising hyaluronic acid.

155. (New) The polymer hydrogel of claim 146, further comprising polyacrylic acid.

156. (New) The polymer hydrogel of claim 146, further comprising a therapeutic agent.